Imagery ©2019 Google, Map data ©2019 Google 2000 ft

1 VICINITY MAP
Not To Scale

PROJECT DESCRIPTION
CONSTRUCTION OF 406 SF ADDITION TO EXISTING SINGLE FAMILY RESIDENCE.

PROJECT ADDRESS
12229 SE 10TH ST, BELLEVUE, WA 98005

PROPERTY OWNERS
ANDY AND TOMOE ANDERSON

LEGAL DESCRIPTION
LOT 38, WOODBRIDGE DIV # 3, VOL. 60, PAGE 75, RECORDS OF KING COUNTY, WASHINGTON.

KING CO PARCEL #
954200-0190

ZONING
R-3.5

LOT COVERAGE CALCS

LOT AREA = 14,790 SF
STEEP SLOPE CRITICAL AREA = 364 SF
REVISED LOT AREA = 14,426 SF
EXISTING FOOTPRINT AREA = 1322 SF
PROPOSED ADDITION = 406 SF
NEW FOOTPRINT AREA = 1728 SF

1728 / 14,426 = 12.0% (STRUCTURE COVERAGE)

IMPERVIOUS SURFACES

LOT AREA = 14,790 SF

EXISTING HOUSE FOOTPRINT = 1322 SF
EXISTING PAVED AREAS = 1570 SF
PROPOSED ADDITION = 406 SF
PROPOSED DECK = 470 SF

TOTAL IMPERVIOUS AREAS = 3768 SF
3768 / 14,790 = 25.5%

SITE NOTES

CODES
BELLEVUE LAND USE CODE
BELLEVUE CONSTRUCTION CODES

1. NO REMOVAL OF SIGNIFICANT TREES OR VEGETATION. ALL TREES TO REMAIN.

2. NO RE-GRADING OF OVERALL SITE. GROUND DISTURBANCE ONLY FOR FOUNDATION WORK, HARDSCAPING, STORMWATER DRAINAGE ELEMENTS, AND BELOW-GRADE UTILITIES.

3. TEMPORARY CUTS FOR CONSTRUCTION ACTIVITY SHALL BE NO GREATER THAN 1:1 (HORIZ:VERT).

4. SLOPE GROUND AND ANY PAVED AREAS ADJACENT TO STRUCTURE AWAY FROM THE HOUSE, 6" PER 10', FOR 3' MIN.

5. PROVIDE STORMWATER MANAGEMENT AND CONSTRUCTION STORMWATER POLLUTION PREVENTION MEASURES PER THE STORM AND SURFACE WATER ENGINEERING STANDARDS. MEET MINIMUM REQUIREMENT #2.

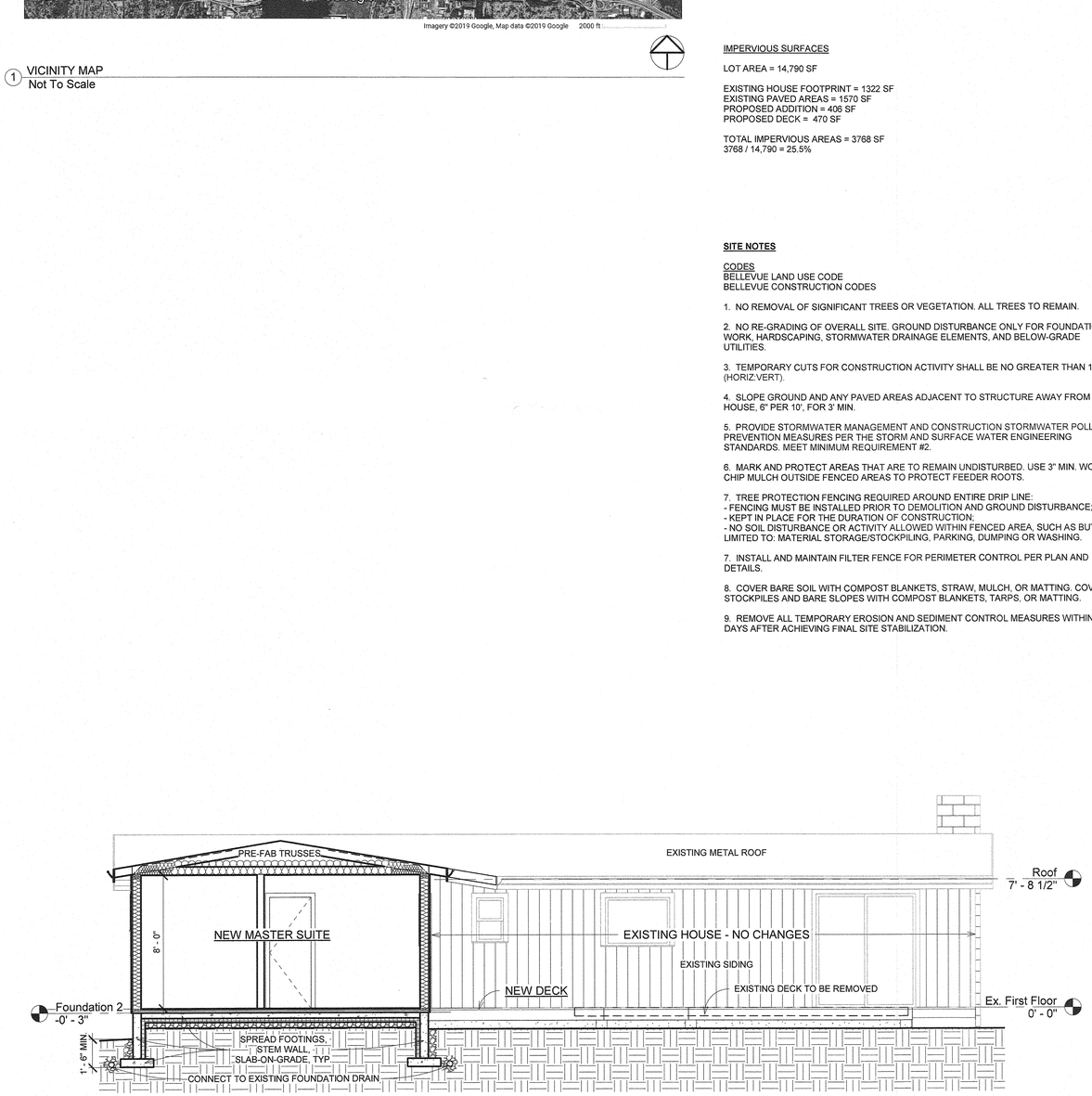
6. MARK AND PROTECT AREAS THAT ARE TO REMAIN UNDISTURBED. USE 3" MIN. WOOD CHIP MULCH OUTSIDE FENCED AREAS TO PROTECT FEEDER ROOTS.

7. TREE PROTECTION FENCING REQUIRED AROUND ENTIRE DRIP LINE:
- FENCING MUST BE INSTALLED PRIOR TO DEMOLITION AND GROUND DISTURBANCE;
- KEPT IN PLACE FOR THE DURATION OF CONSTRUCTION;
- NO SOIL DISTURBANCE OR ACTIVITY ALLOWED WITHIN FENCED AREA, SUCH AS BUT NOT LIMITED TO: MATERIAL STORAGE/STOCKPILING, PARKING, DUMPING OR WASHING.

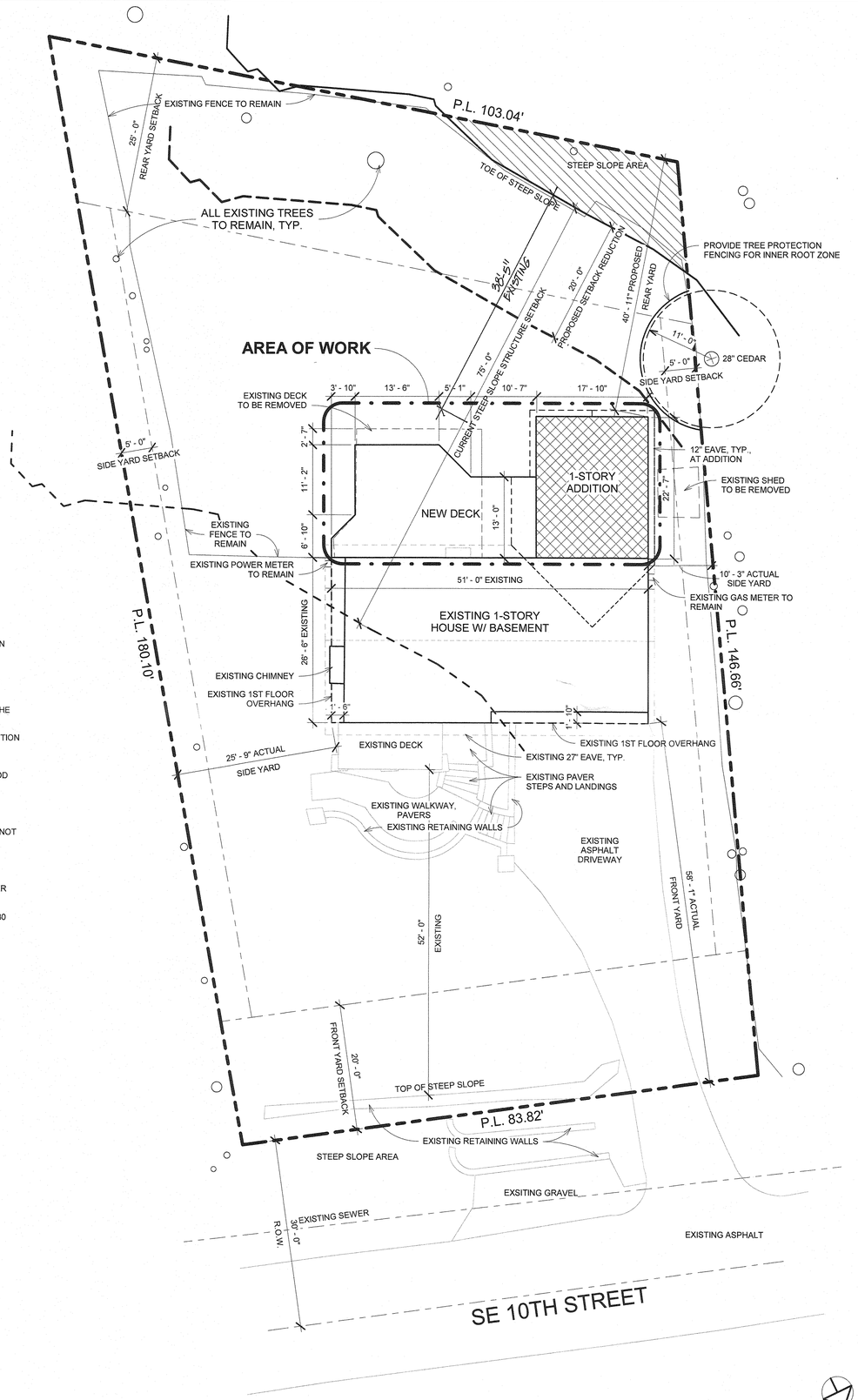
7. INSTALL AND MAINTAIN FILTER FENCE FOR PERIMETER CONTROL PER PLAN AND DETAILS.

8. COVER BARE SOIL WITH COMPOST BLANKETS, STRAW, MULCH, OR MATTING. COVER STOCKPILES AND BARE SLOPES WITH COMPOST BLANKETS, TARPS, OR MATTING.

9. REMOVE ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES WITHIN 30 DAYS AFTER ACHIEVING FINAL SITE STABILIZATION.



3 CROSS-SECTION THROUGH ADDITION
1/4" = 1'-0"



2 ARCHITECTURAL SITE PLAN
1" = 10'-0"

Project Name:

Anderson Addition

Project Adress:
12229 SE 10th St
Bellevue, WA 98005

Property Owner:
Tomoe and Andy Anderson

PROJECT TEAM

Architect:
Grace Huang, AIA
ming | architecture and design
111 W John St, Suite 306, Seattle, WA 98119
206.272.9900
grace@mingad.com

Geotechnical Engineer:
H Michael Xue, PE
PanGEO Inc.
3213 Eastlake Ave E, Ste B, Seattle, WA 98102
206.262.0370
mxue@pangeoinc.com

Structural Engineer:
Andrew Schuenemann
Ellipsis Structural Engineering
3847 23rd Ave SW, Seattle, WA 98106
info@ellipsispllc.com

Contractor:
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.
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Issue History

Issue Description	Issue Date
xxx	xx-xx-xxxx

Issue Description:
For Critical Areas Land Use Permit

Issue Date:
01-10-2019

SHEET INDEX:

Building Department Stamps:

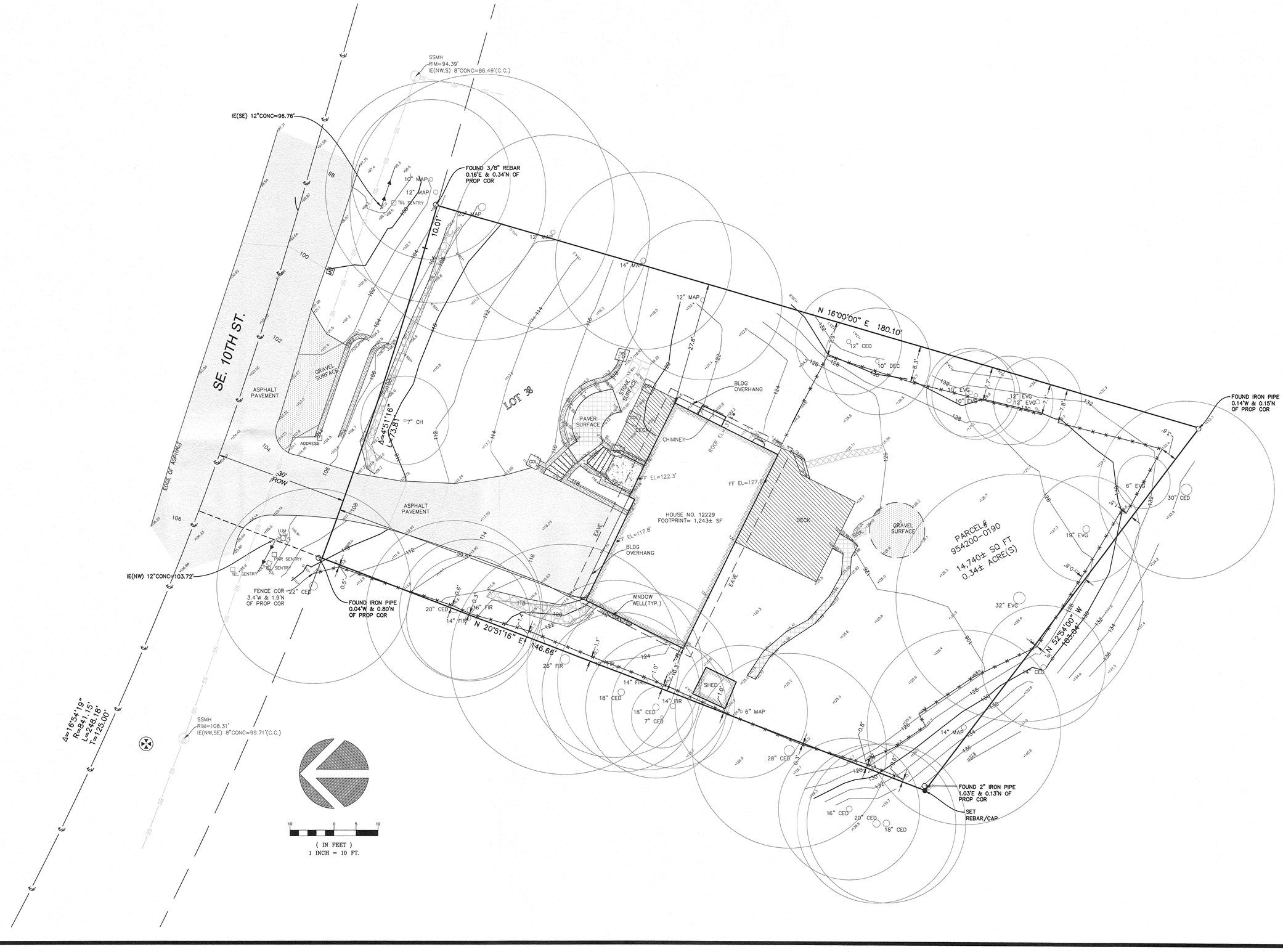
Sheet Title:
Project Info, Site Plan, Site Notes, Section

Received
JAN 11 2019
Permit Processing

Sheet Number:
A1

1/10/2019 4:48:57 PM

TOPOGRAPHIC & BOUNDARY SURVEY



measure success

TOPOGRAPHIC & BOUNDARY SURVEY
NE 1/4 OF NW 1/4 SEC. 4, TWP. 24 N., RGE. 5 E., W.M.
PARCEL NO. 954200-0190

PATHWAY DESIGN & CONSTRUCTION
12229 SE. 10TH ST.
BELLEVUE, WA. 98005

VANCE E. BLUE
WASHINGTON
LAND SURVEYOR
21145
REGISTERED
PROFESSIONAL

Terrane
10801 Main Street, Suite 102, Bellevue, WA 98004
phone 425.458.4488 support@terrane.net
www.terrane.net

JOB NUMBER:	180718
DATE:	5/23/18
DRAFTED BY:	LCH
CHECKED BY:	VVB
SCALE:	1"= 10'

REVISION HISTORY

Received
JAN 11 2019
Permit Processing

SHEET NUMBER
2 OF 2

PanGEO
INCORPORATED
Geotechnical & Earthquake
Engineering Consultants

January 3, 2019
File No. 18-412

Mr. Andrew Anderson
12229 SE 10th Street
Bellevue, WA 98005

Subject: Critical Areas and Geotechnical Report
Proposed Addition
12229 SE 10th Street, Bellevue, Washington

Dear Mr. Anderson,

As requested, PanGEO has completed a geotechnical critical area report to assist the project team with the design and construction of the proposed addition at the above-referenced site. This study was performed in general accordance with our mutually agreed scope of work outlined in our proposal dated November 27, 2018, which was approved by you on December 6, 2018. Our service scope included reviewing readily available geologic data in the project vicinity, drilling two test borings, conducting a site reconnaissance, performing engineering analysis, and developing the conclusions and recommendations presented in this report.

SITE AND PROJECT DESCRIPTION

The subject property is an approximately 14,790 square foot lot located at 12229 SE 10th Street in Bellevue, Washington (see Vicinity Map, Figure 1). The site is roughly rectangular in shape, and borders SE 10th Street to approximately the north, and existing single-family residences to the south, east, and west. The site is currently occupied by a one-story house with a daylight basement in the central portion of the lot (see Figure 2).

We understand that you plan to construct an addition on the southwest side of the existing house (see Site and Exploration Plan, Figure 2). We further understand that the proposed addition will be a one-story wood frame structure with foundations near the existing grade. We anticipate that temporary excavations for the proposed addition will be about 4 feet for the addition foundation construction.

3213 Eastlake Ave E, Ste B
Seattle, WA 98102
Tel (206) 262-0370
Fax (206) 262-0374

Based on review of the site plan and King County iMap, steep slopes exist near the south property line and on the south neighboring lot, and the proposed addition is located within 50 feet of the steep slopes. As such, a critical areas and critical area geotechnical report is required by the city as part of the permit application due to the presence of the steep slopes.

Photo 1. Rear view of the existing house and proposed addition location (left). Looking north from the south property line.

Photo 2. View of the steep slope along the south property line. Looking southeast from the southwest property corner.

The conclusions and recommendations outlined and provided in this report are based on our understanding of the proposed development, which is in turn based on the project information provided. If the above project description is incorrect, or the project information changes, we should be consulted to review the recommendations contained in this study and make modifications, if needed.

SUBSURFACE EXPLORATIONS

Two test borings (PG-1 and PG-2) were drilled at the site on December 27, 2018 using an acker portable drill rig owned and operated by Bore-Tec, Inc. of Spangle, Washington. The borings were drilled to depths of about 9½ and 11½ feet below the existing grades, respectively. The approximate boring locations were taped in the field from on-site features, and are shown on Figure 2.

The drill rig was equipped with 4-inch outside diameter hollow stem augers. Soil samples were obtained from the borings at 2½- and 5-foot depth intervals in general accordance with Standard Penetration Test (SPT) sampling methods (ASTM test method D-1586) in which the samples are obtained using a 2-inch outside diameter split-spoon sampler. The sampler was driven into the

soil a distance of 18 inches using a 140-pound weight freely falling a distance of 30 inches. The number of blows required for each 6-inch increment of sampler penetration was recorded. The number of blows required to achieve the last 12 inches of sample penetration is defined as the SPT N-value. The N-value provides an empirical measure of the relative density of cohesionless soil, or the relative consistency of fine-grained soils.

A geologist from PanGEO was present during the field exploration to observe the drilling, assist in sampling, and to describe and document the soil samples obtained from the borings. The soil samples were described and field classified in general accordance with the modified Unified Soil Classification System outlined in Figure A-1, and the summary boring logs are included as Figure A-2 and A-3 at the end of this report.

SITE GEOLOGY AND SUBSURFACE CONDITIONS

SITE GEOLOGY

According to the Geologic Map of King County, Washington (Booth, et al., 2007), the site is underlain by Vashon Advance Outwash (Geologic Map Unit: Qva). Pre-Fraser fine-grained deposits (Qpff) and Vashon till (Qvt) are also mapped in the site vicinity. The following is a brief description of each geologic units mapped, from youngest to the oldest:

Vashon till (Qvt) consists of an unsorted mixture of clay, silt, sand and gravel that was directly deposited below a glacier during the Vashon Stade of the Fraser Glaciation. This soil unit has been glacially overridden; as such it is typically dense to very dense.

Advance outwash (Qva) consists of interbedded sand, gravel, and cobbles deposited in meltwater streams during the advance of the Vashon Stade of the Fraser Glaciation. This deposit is also glacially overridden, and as such is typically dense to very dense.

Pre-Fraser fine-grained deposits (Qpff) are described by Booth et al. as laminated to massive silt and clay with sandy interbeds of indeterminate origin deposited prior to the Fraser glaciation. This deposit is also glacially overridden, and as such is typically hard.

The subsurface conditions encountered in our exploration at the project site appears to be generally consistent with mapped geology.

SOIL AND GROUNDWATER CONDITIONS

The soils observed in our borings generally consisted of fill and colluvium overlying the mapped Vashon advance outwash. The following is a brief description of the soils encountered in the borings advanced at the site. Please refer to the summary boring logs (Figure A-2 and A-3) for details.

Unit 1 - Fill: Below a surficial topsoil layer, fill was encountered in PG-1 to about 5 feet below the surface. The fill generally consisted of loose, silty, gravelly sand with cobbles and trace fine organics. This unit is distinguished by its loose condition, disturbed appearance, and the presence of fine organic debris. Unit 1 was not encountered at PG-2.

Unit 2 – Colluvium (Qmw): Below a surficial topsoil layer, colluvium was encountered in PG-2 to about 7 feet below the surface. This unit consisted of loose, slightly silty to silty sand with trace gravel. This unit is distinguished by its loose condition, somewhat interbedded soil structure, and the presence of wood fragments. Unit 2 was not encountered at PG-1.

***Unit 3 - Vashon Advance Outwash (Qva)*:** Below the fill and colluvium, both borings encountered medium dense to very dense silty, gravelly sand to the maximum exploration depths of about 9½ and 11½ feet below the surface. This unit appeared to be consistent with the mapped Vashon advance outwash deposit.

No groundwater was observed within the drilling depths during drilling. It should be noted that the groundwater level at the site will vary depending on the season, local subsurface conditions, and other factors. Groundwater levels and seepage rates are normally highest during the winter and early spring.

GEOLOGIC HAZARDS ASSESSMENT

As part of our study, we conducted a geologic hazards assessment for the proposed development as part of our study. The assessment included evaluation of Landslide Hazards, Seismic (Earthquake) Hazards, and Erosion Hazards. Based on our review of the City of Bellevue's Geologic Hazards Map (Figure 3), the site topographic map, and King County iMap, steep slopes (40% and greater) exist at the northeast corner of the site, southwest corner of the site, and the neighboring site to the south. However, the site is not mapped as an erosion hazard area or a

seismic hazard area. The following sections contain our assessment of potential geologic hazards and their possible effect on the proposed development.

LANDSLIDE HAZARDS AND STEEP SLOPES EVALUATION

Based on the topographic survey map and King County iMap, we understand that the slope rising from the south property line to the south qualifies as a steep slope (40% or greater). Based on King County iMap, the steep slope is approximately 40 feet in height and the slope gradients are about 45 to 55 percent.

As part of our study, we conducted a site reconnaissance of the subject property and the steep slopes to the south of the property on December 20 and 27, 2018. During our site reconnaissance, we observed the existing condition of the site and adjacent properties to look for evidence of past or ongoing instability, such as scarps, sloughs, tension cracks, uneven ground surfaces, jackstrawed trees, breaks in vegetation, water features and convergent landforms. We did not observe any obvious evidence of past slope instability during our site reconnaissance. Additionally, we observed that the steep slopes are covered with some bushes and trees, and mature trees on the steep slopes are observed to be straight. To the best of our knowledge, there are no reported past known slides at the site and immediate vicinity.

Based on our observations of ground features and the subsurface conditions (i.e. dense soil conditions at the shallow depths), it is our opinion that the site is globally stable in its current configuration. It is also our opinion that the proposed addition construction will not adversely impact the overall global stability of the subject site and surrounding properties, provided that the recommendations presented in this report are properly incorporated into the design and construction of the project.

Structure Setback – Since the slope rising from the south property line qualifies as a steep slope (40% or greater), the proposed addition will be located within the 75 feet of critical steep slope structure setback. Based on the steep slope height, the observed slope conditions, the soil conditions at the site, and current design scope of the addition, it is our opinion that the 75 feet structure setback distance may be reduced to 20 feet. It is also our opinion that the recommended structure setback reduction and the proposed addition as currently planned will not decrease the overall global slope stability and adversely impact the subject and surrounding properties, provided the proposed addition project is properly designed and constructed in accordance with the current building code and common practice.

EROSION HAZARDS EVALUATION

The site is not mapped within a potential erosion control area in accordance with the City of Bellevue's Surface Geology and Soils with Severe Erosion Potential Map. Based on our test borings, the site soils are anticipated to exhibit low to moderate erosion potential when disturbed and left unprotected. However, in our opinion, the erosion hazards at the site can be effectively mitigated with best management practices during construction and with properly designed and implemented landscaping for permanent erosion control. During construction, the temporary erosion hazard can also be effectively managed with an appropriate erosion and sediment control plan, including but not limited to installing a silt fence at the construction perimeter, placing quarry spalls or hay bales at the disturbed and traffic areas, covering stockpiled soil or cut slopes with plastic sheets, constructing a temporary drainage pond to control surface runoff and sediment trap, placing rocks at the construction entrance, etc.

Permanent erosion control measures should be applied to the disturbed areas as soon as feasible. These measures may include but not limited to planting and hydroseeding. The use of permanent erosion control mat may also be considered in conjunction with planting/hydroseeding to protect the soils from erosion.

SEISMIC HAZARDS EVALUATION

The City of Bellevue defines seismic hazard areas as those areas subject to severe risk of earthquake damage as a result of seismically induced settlement or soil liquefaction. According to the City of Bellevue's Geologic Hazards Map, the site is not mapped within a seismic hazard area.

Soil liquefaction is a condition where saturated cohesionless soils undergo a substantial loss of strength due to the build-up of excess pore water pressures resulting from cyclic stress applications induced by earthquakes. Soils most susceptible to liquefaction are loose, uniformly graded sands and loose silts with little cohesion.

Based on the dense soil conditions at the shallow depths and lack of static groundwater table at the shallow depths, in our opinion, the potential for soil liquefaction at the site during a design earthquake is considered to be negligible. As such, in our opinion, special design considerations associated with soil liquefaction are not needed for this project.

GEOTECHNICAL DESIGN RECOMMENDATIONS

SITE CLASS AND SEISMIC DESIGN PARAMETERS

We anticipate that the seismic evaluation of the structures will be accomplished in accordance with the 2015 International Building Code (IBC). The IBC seismic design parameters are in part based on the site soil conditions and site classifications. Based on 2015 IBC and the publication ASCE 7-02, it is our opinion that Site Class D is appropriate for the project site.

The Table 1 below provides seismic design parameters for the site that are in conformance with the 2015 edition of the International Building Code (IBC), which specifies a design earthquake having a 2% probability of occurrence in 50 years (return interval of 2,475 years), and the 2008 USGS seismic hazard maps.

Table 1 - 2015 IBC Seismic Design Parameters

Site Class	Spectral Acceleration at 0.2 sec. (g) S_S	Spectral Acceleration at 1.0 sec. (g) S_1	Site Coefficients		Design Spectral Response Parameters	
			F_a	F_v	S_{DS}	S_{D1}
D	1.326	0.51	1.0	1.5	0.884	0.51

ADDITION FOUNDATIONS

Based on the subsurface conditions encountered in our borings and our understanding of the planned development, it is our opinion that the proposed addition may be supported on conventional footings bearing on the native medium dense to dense silty sand (advance outwash deposits) or on newly placed structural fill placed upon recompacted native soils. Based on the results of our subsurface exploration, we anticipate competent bearing soils to be present at about 5 feet below the existing grade. As such, limited over-excavation of loose foundation soils may be required. The following sections present our foundation design recommendations.

Allowable Bearing Pressure – We recommend that an allowable soil bearing pressure of 2,000 psf be used to size the footings. For allowable stress design, the recommended allowable bearing pressure may be increased by 1/3 for transient loading conditions such as wind and earthquake. Continuous and individual spread footings should have minimum widths of 18 and

24 inches, respectively. Footings should be placed at least 18 inches below final exterior grade. Interior footings should be placed at least 12 inches below the top of slab. The addition footings should be designed so that they will not surcharge the existing basement walls.

Lateral Resistance – Lateral loads on the structures may be resisted by passive earth pressure developed against the embedded portion of the foundation system and by frictional resistance between the bottom of the foundation and the supporting subgrade soils. For footings bearing on the recompacted sand/structural fill, a frictional coefficient of 0.35 may be used to evaluate sliding resistance developed between the concrete and the compacted subgrade soil. Passive soil resistance may be calculated using an equivalent fluid weight of 275 pcf, assuming properly compacted native sand and structural fill will be placed against the footings. The above values include a factor of safety of 1.5. Unless covered by pavements or slabs, the passive resistance in the upper 12 inches of soil should be neglected.

Foundation Subgrade Preparation and Over-excavation – Footing subgrades should be in a dense and stable condition prior to setting forms and placing reinforcing steel. Any loose or softened soil should be removed from the footing excavations. The adequacy of the footing subgrade soils should be verified by a representative of PanGEO, prior to placing forms or rebar.

Retaining Wall Design Parameters

Retaining walls, if needed, should be properly designed to resist the lateral earth pressures exerted by the soils behind the walls. Proper drainage provisions should also be provided behind the walls to intercept and remove groundwater that may be present behind the wall. Our geotechnical recommendations for the design and construction of the retaining/basement walls are presented below.

Lateral Earth Pressures

Concrete cantilever walls should be designed for an equivalent fluid pressure of 35 pcf for level backfills behind the walls assuming the walls are free to rotate. If walls are to be restrained at the top from free movement, equivalent fluid pressures of 45 pcf should be used for level backfills behind the walls.

Permanent walls should be designed for an additional uniform lateral pressure of 7H psf for seismic loading, where H corresponds to the buried depth of the wall. The recommended lateral

pressures assume that the backfill behind the wall consists of a free draining and properly compacted fill with adequate drainage provisions.

Surcharge

Surcharge loads, where present, should also be included in the design of retaining walls. We recommend that a lateral load coefficient of 0.3 be used to compute the lateral pressure on the wall face resulting from surcharge loads located within a horizontal distance of one-half wall height.

Lateral Resistance

Lateral forces from seismic loading and unbalanced lateral earth pressures may be resisted by a combination of passive earth pressures acting against the embedded portions of the foundations and by friction acting on the base of the foundations. Passive resistance values may be determined using an equivalent fluid weight of 275 pcf. This value includes a factor of safety of 1.5, assuming the footing is poured against dense native sand, re-compacted on-site sandy soil or properly compacted structural fill adjacent to the sides of footing. A friction coefficient of 0.35 may be used to determine the frictional resistance at the base of the footings. The coefficient includes a factor safety of 1.5.

Wall Drainage

Provisions for wall drainage should consist of a 4-inch diameter perforated drainpipe placed behind and at the base of the wall footings, embedded in 12 to 18 inches of clean crushed rock or pea gravel wrapped with a layer of filter fabric. Where applicable, in-lieu of conventional footing drains, weep holes (2" diameter and 10 feet on center) may be used for site retaining walls. A minimum 18-inch wide zone of free draining granular soils (i.e. pea gravel or washed rock) is recommended to be placed adjacent to the wall for the full height of the wall. Alternatively, a composite drainage material, such as Miradrain 6000, may be used in lieu of the clean crushed rock or pea gravel. The drainpipe at the base of the wall should be graded to direct water to a suitable outlet.

Wall Backfill

Given the high fines continent of the soils encountered in our borings, we do not recommend using these on-site soils for wall backfill. Wall backfill should consist of imported, free draining

granular material, such as WSDOT Gravel Borrow. In areas where the space is limited between the wall and the face of excavation, clean crushed rock may be used as backfill without compaction.

Wall backfill should be moisture conditioned to within about 3 percent of optimum moisture content, placed in loose, horizontal lifts less than 8 inches in thickness, and systematically compacted to a dense and relatively unyielding condition and to at least 95 percent of the maximum dry density, as determined using test method ASTM D 1557. Within 5 feet of the wall, the backfill should be compacted with hand-operated equipment to at least 90 percent of the maximum dry density.

CONSTRUCTION CONSIDERATIONS

TEMPORARY EXCAVATIONS

Temporary excavations will likely be less than 4 to 5 feet for the proposed project. We anticipate the excavations to mainly encounter loose silty sand (fill). All temporary excavations should be performed in accordance with Part N of WAC (Washington Administrative Code) 296-155. The contractor is responsible for maintaining safe excavation slopes and/or shoring.

All temporary excavations deeper than a total of 4 feet should be sloped or shored. In the event that temporary excavations deeper than 4 feet are needed, for planning purposes, they should be sloped 1H:1V or flatter, or properly shored. The temporary cut slopes should be re-evaluated in the field during construction based on actual observed soil conditions, and may need to be flattered in the wet reasons. We also recommend that heavy construction equipment, building materials, excavated soil, and vehicular traffic should not be allowed within a distance equal to 1/3 the slope height from the top of any excavation.

MATERIAL REUSE AND STRUCTURAL FILL

In the context of this report, structural fill is defined as compacted fill placed under footings, concrete stairs and landings, and slabs, or other load-bearing areas. In our opinion, the on-site soils are not suitable as structural fill. Structural fill should consist of imported, well-graded, granular material, such as WSDOT Gravel Borrow (WSDOT 9-03.14(1)) or approved equivalent. Well-graded recycled concrete may also be considered as a source of structural fill. Use of recycled concrete as structural fill should be approved by the geotechnical engineer. The on-site sand may be used as general fill in the landscaping areas. If use of the on-site soil is

planned, the excavated soil should be stockpiled and protected with plastic sheeting to prevent softening from rainfall in the wet season.

STRUCTURAL FILL PLACEMENT AND COMPACTION

Structural fill should be moisture conditioned to within about 3 percent of optimum moisture content, placed in loose, horizontal lifts less than 8 inches in thickness, and systematically compacted to a dense and relatively unyielding condition and to at least 95 percent of the maximum dry density, as determined using test method ASTM D 1557.

Depending on the type of compaction equipment used and depending on the type of fill material, it may be necessary to decrease the thickness of each lift in order to achieve adequate compaction. PanGEO can provide additional recommendations regarding structural fill and compaction during construction.

WET WEATHER EARTHWORK

In our opinion, the proposed site construction may be accomplished during wet weather (such as in winter) without adversely affecting the site stability. However, earthwork construction performed during the drier summer months likely will be more economical. Winter construction will require the implementation of best management erosion and sedimentation control practices to reduce the chance of off-site sediment transport. Some of the site soils contain a high percentage of fines and are moisture sensitive. Any footing subgrade soils that become softened either by disturbance or rainfall should be removed and replaced with structural fill, Controlled Density Fill (CDF), or lean-mix concrete. General recommendations relative to earthwork performed in wet conditions are presented below:

- Site stripping, excavation and subgrade preparation should be followed promptly by the placement and compaction of clean structural fill or CDF;
- The size and type of construction equipment used may have to be limited to prevent soil disturbance;
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water;

- Bales of straw and/or geotextile silt fences should be strategically located to control erosion and the movement of soil;
- Structural fill should consist of less than 5% fines; and
- Excavation slopes should be covered with plastic sheets.

SURFACE DRAINAGE AND EROSION CONSIDERATIONS

Surface runoff can be controlled during construction by careful grading practices. Typically, this includes the construction of shallow, upgrade perimeter ditches or low earthen berms in conjunction with silt fences to collect runoff and prevent water from entering excavations or to prevent runoff from the construction area from leaving the immediate work site. Temporary erosion control may require the use of hay bales on the downhill side of the project to prevent water from leaving the site and potential storm water detention to trap sand and silt before the water is discharged to a suitable outlet. All collected water should be directed under control to a positive and permanent discharge system.

Permanent control of surface water should be incorporated in the final grading design. Adequate surface gradients and drainage systems should be incorporated into the design such that surface runoff is directed away from structures. Potential problems associated with erosion may also be reduced by establishing vegetation within disturbed areas immediately following grading operations.

ADDITIONAL SERVICES

To confirm that our recommendations are properly incorporated into the design and construction of the proposed addition, PanGEO should be retained to conduct a review of the final project plans and specifications, and to monitor the construction of geotechnical elements. The City of Bellevue, as part of the permitting process, will also require geotechnical construction inspection services.

We anticipate that the following additional services will be required:

- Review final project plans and specifications
- Verify the adequacy of soil bearing;

- Confirm the adequacy of the compaction of structural backfill; and
- Other consultation as may be required during construction

Modifications to our recommendations presented in this report may be necessary, based on the actual conditions encountered during construction.

CLOSURE

We have prepared this report for Mr. Andrew Anderson and the project design team. Recommendations contained in this report are based on a site reconnaissance, a subsurface exploration program, review of pertinent subsurface information, and our understanding of the project. The study was performed using a mutually agreed-upon scope of work.

Variations in soil conditions may exist between the locations of the explorations and the actual conditions underlying the site. The nature and extent of soil variations may not be evident until construction occurs. If any soil conditions are encountered at the site that are different from those described in this report, we should be notified immediately to review the applicability of our recommendations. Additionally, we should also be notified to review the applicability of our recommendations if there are any changes in the project scope.

The scope of our work does not include services related to construction safety precautions. Our recommendations are not intended to direct the contractors' methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design. Additionally, the scope of our work specifically excludes the assessment of environmental characteristics, particularly those involving hazardous substances. We are not mold consultants nor are our recommendations to be interpreted as being preventative of mold development. A mold specialist should be consulted for all mold-related issues.

This report has been prepared for planning and design purposes for specific application to the proposed project in accordance with the generally accepted standards of local practice at the time this report was written. No warranty, express or implied, is made.

This report may be used only by the client and for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both off and on-site), or other factors including advances in our understanding of applied science, may change over time and could materially

affect our findings. Therefore, this report should not be relied upon after 24 months from its issuance. PanGEO should be notified if the project is delayed by more than 24 months from the date of this report so that we may review the applicability of our conclusions considering the time lapse.

It is the client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, etc., are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk. Any party other than the client who wishes to use this report shall notify PanGEO of such intended use and for permission to copy this report. Based on the intended use of the report, PanGEO may require that additional work be performed and that an updated report be reissued. Noncompliance with any of these requirements will release PanGEO from any liability resulting from the use this report.

We appreciate the opportunity to be of service.

Sincerely,

Bart Weitering

HONGBO MICHAEL XUE
STATE OF WASHINGTON
35016
REGISTERED
PROFESSIONAL ENGINEER

1/3/2019

Bart Weitering, G.I.T.
Staff Geologist

H. Michael Xue, P.E.
Senior Geotechnical Engineer

Enclosures:

Figure 1	Vicinity Map
Figure 2	Site and Exploration Plan
Figure 3	Geologic Hazards Map

Appendix A **Summary Test Boring Logs**

Figure A-1	Terms and Symbols for Boring and Test Pit Logs
Figure A-2	Log of Test Boring PG-1
Figure A-3	Log of Test Boring PG-2

REFERENCES

ASTM D1557-12e1, *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))*, ASTM International, West Conshohocken, PA, 2012, www.astm.org

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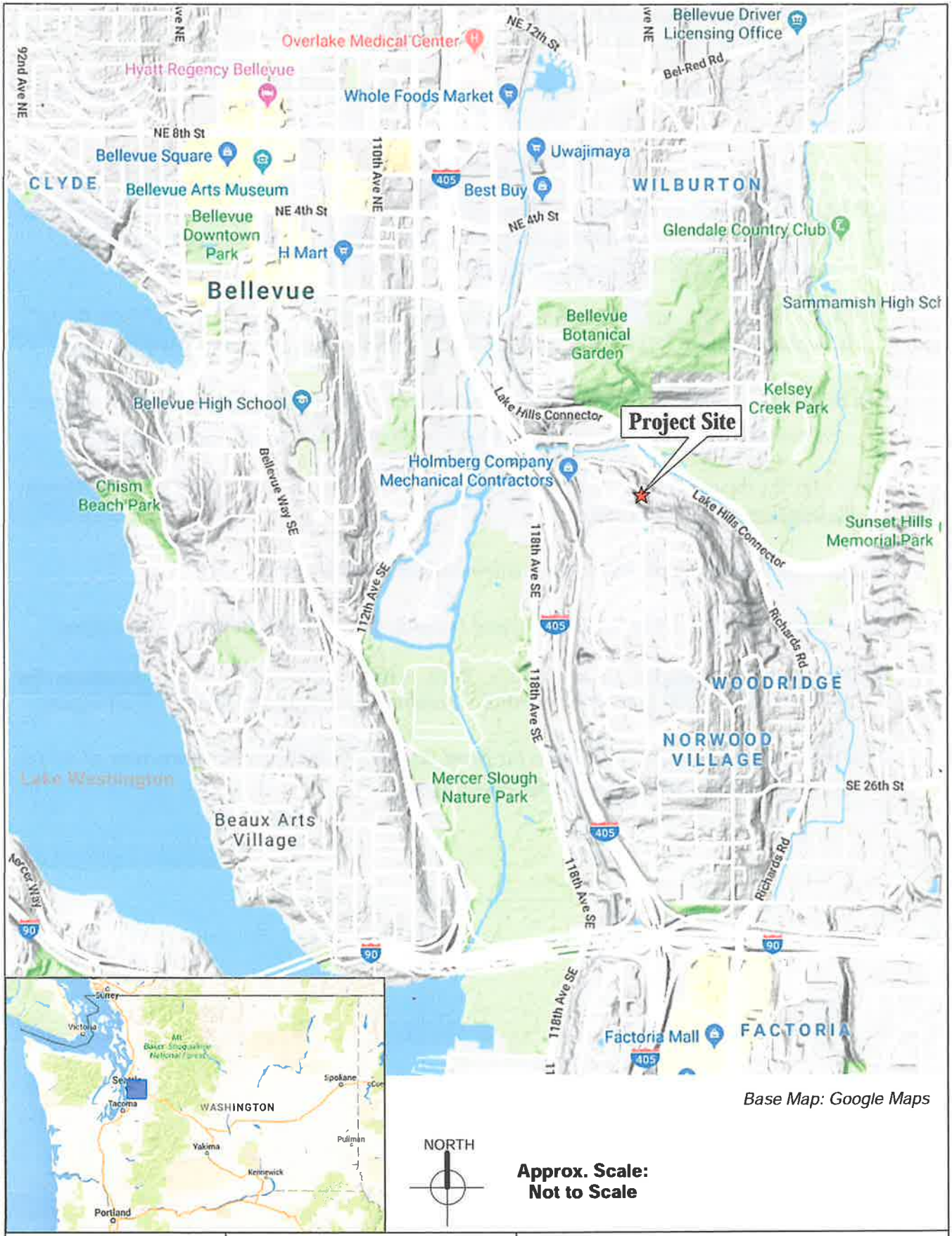


Base Map: Google Maps

NORTH

Approx. Scale: Not to Scale

PanGEO INCORPORATED

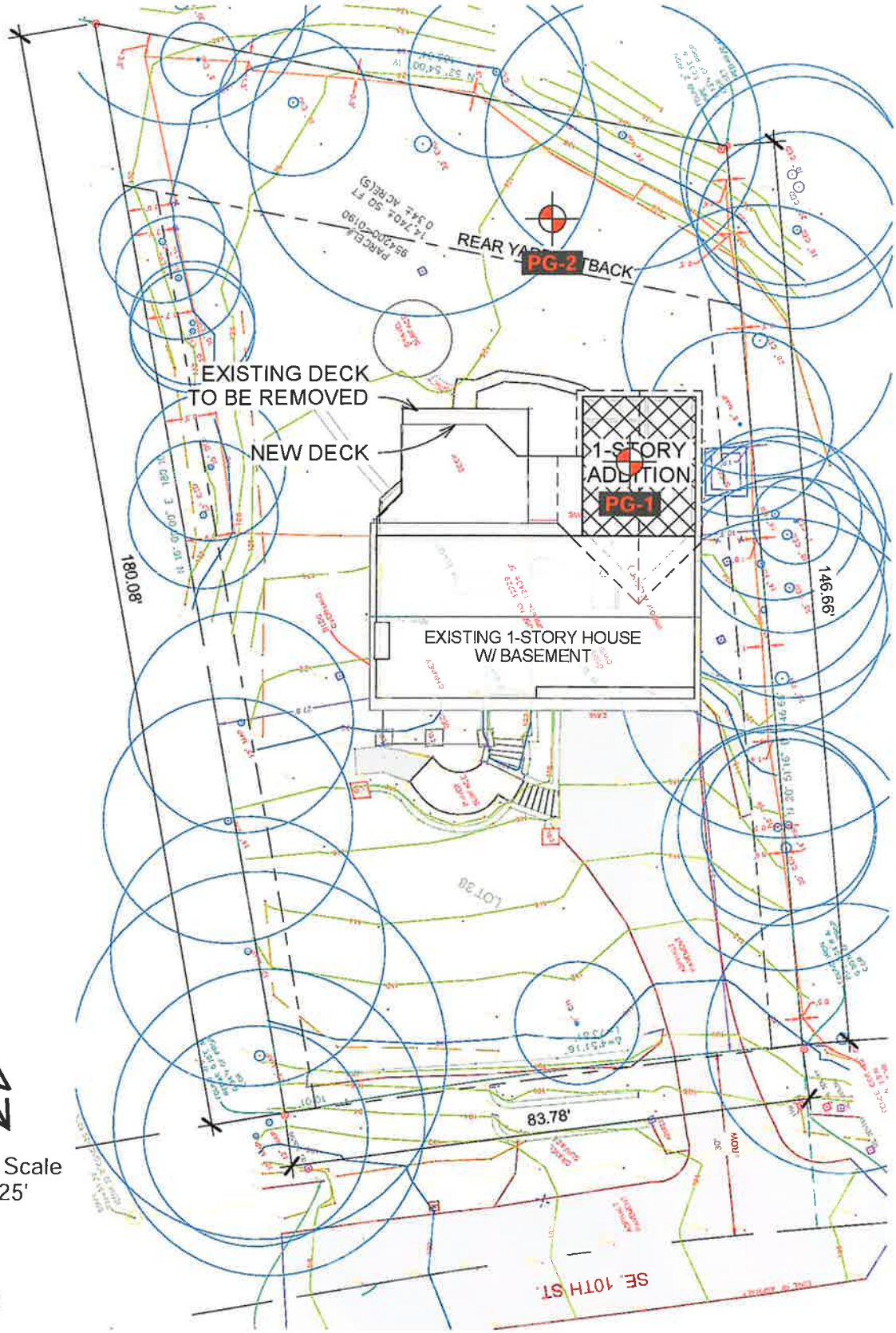
Proposed Addition
12229 SE 10th Street
Bellevue, Washington

VICINITY MAP

Project No. **18-412**

Figure No. **1**

file.grf w/ file.dat 12/28/18 (11:14) SDD



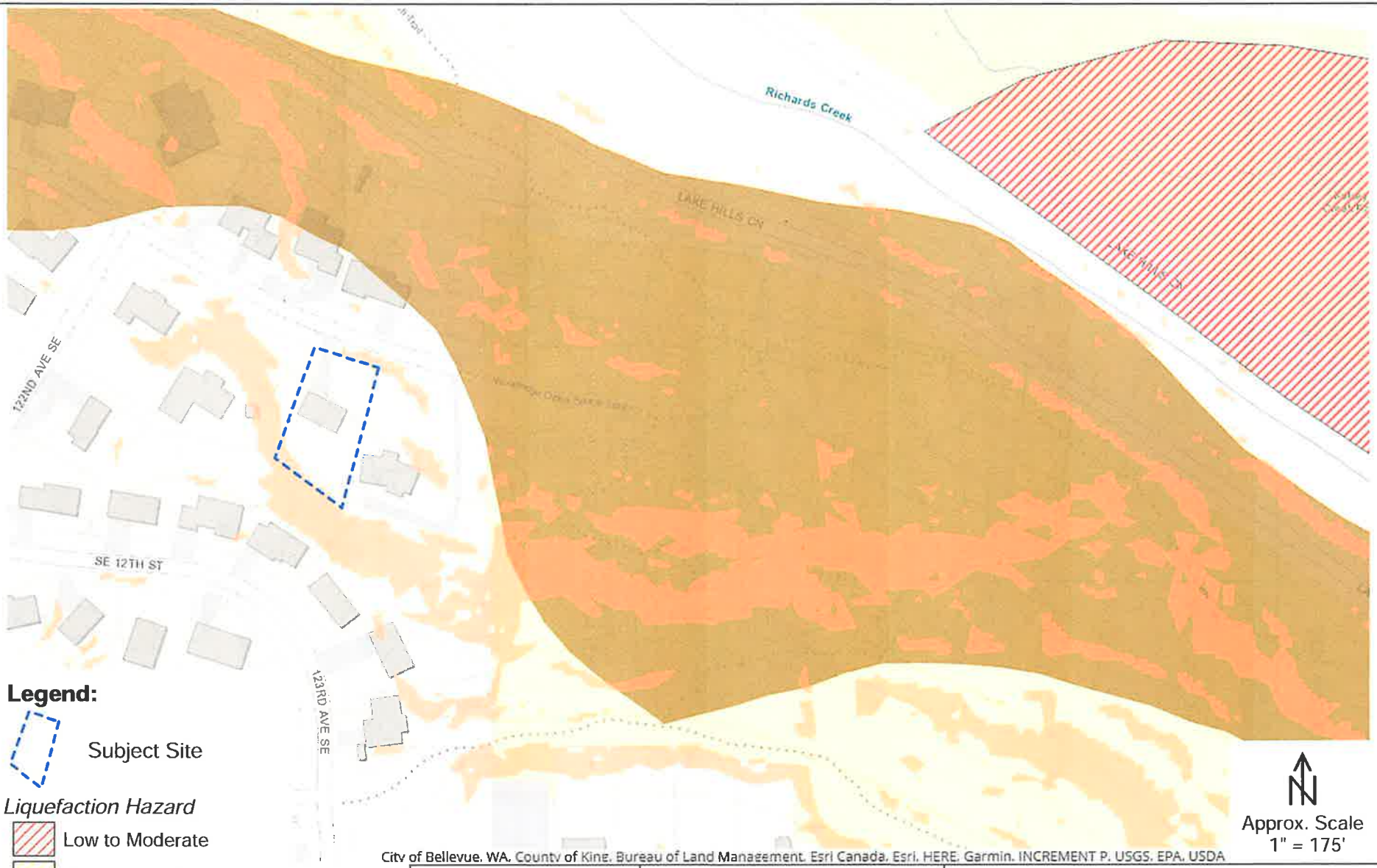
Approx. Scale
1" = 25'

Legend:

Approx. Test Boring Location

Note: Base map modified from Preliminary Site Plan by Ming Architecture and Design dated November 20, 2018

PanGEO INCORPORATED	**Proposed Addition** **12229 SE 10th Street** **Bellevue, Washington**	**SITE AND EXPLORATION PLAN**	
		Project No. **18-412**	Figure No. **2**



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Proposed Addition
12229 SE 10th Street
Bellevue, Washington

GEOLOGIC HAZARDS MAP

Project No. **18-412**

Figure No. **3**

APPENDIX A

SUMMARY TEST BORING LOGS

RELATIVE DENSITY / CONSISTENCY

SAND / GRAVEL			SILT / CLAY		
Density	SPT N-values	Approx. Relative Density (%)	Consistency	SPT N-values	Approx. Undrained Shear Strength (psf)
Very Loose	<4	<15	Very Soft	<2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Med. Dense	10 to 30	35 - 65	Med. Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	>50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	>30	>4000

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		GROUP DESCRIPTIONS	
Gravel 50% or more of the coarse fraction retained on the #4 sieve. Use dual symbols (eg. GP-GM) for 5% to 12% fines.	GRAVEL (<5% fines)	GW	Well-graded GRAVEL
		GP	Poorly-graded GRAVEL
	GRAVEL (>12% fines)	GM	Silty GRAVEL
		GC	Clayey GRAVEL
Sand 50% or more of the coarse fraction passing the #4 sieve. Use dual symbols (eg. SP-SM) for 5% to 12% fines.	SAND (<5% fines)	SW	Well-graded SAND
		SP	Poorly-graded SAND
	SAND (>12% fines)	SM	Silty SAND
		SC	Clayey SAND
Silt and Clay 50%or more passing #200 sieve	Liquid Limit < 50	ML	SILT
		CL	Lean CLAY
		OL	Organic SILT or CLAY
	Liquid Limit > 50	MH	Elastic SILT
		CH	Fat CLAY
		OH	Organic SILT or CLAY
Highly Organic Soils		PT	PEAT

Notes: 1. Soil exploration logs contain material descriptions based on visual observation and field tests using a system modified from the Uniform Soil Classification System (USCS). Where necessary laboratory tests have been conducted (as noted in the "Other Tests" column), unit descriptions may include a classification. Please refer to the discussions in the report text for a more complete description of the subsurface conditions.

2. The graphic symbols given above are not inclusive of all symbols that may appear on the borehole logs. Other symbols may be used where field observations indicated mixed soil constituents or dual constituent materials.

DESCRIPTIONS OF SOIL STRUCTURES

Layered: Units of material distinguished by color and/or composition from material units above and below

Laminated: Layers of soil typically 0.05 to 1mm thick, max. 1 cm

Lens: Layer of soil that pinches out laterally

Interlayered: Alternating layers of differing soil material

Pocket: Erratic, discontinuous deposit of limited extent

Homogeneous: Soil with uniform color and composition throughout

Fissured: Breaks along defined planes

Slickensided: Fracture planes that are polished or glossy

Blocky: Angular soil lumps that resist breakdown

Disrupted: Soil that is broken and mixed

Scattered: Less than one per foot

Numerous: More than one per foot

BCN: Angle between bedding plane and a plane normal to core axis

COMPONENT DEFINITIONS

COMPONENT	SIZE / SIEVE RANGE	COMPONENT	SIZE / SIEVE RANGE
Boulder:	> 12 inches	Sand	
Cobbles:	3 to 12 inches	Coarse Sand:	#4 to #10 sieve (4.5 to 2.0 mm)
Gravel		Medium Sand:	#10 to #40 sieve (2.0 to 0.42 mm)
Coarse Gravel:	3 to 3/4 inches	Fine Sand:	#40 to #200 sieve (0.42 to 0.074 mm)
Fine Gravel:	3/4 inches to #4 sieve	Silt	0.074 to 0.002 mm
		Clay	<0.002 mm

TEST SYMBOLS

for In Situ and Laboratory Tests listed in "Other Tests" column.

ATT	Atterberg Limit Test
Comp	Compaction Tests
Con	Consolidation
DD	Dry Density
DS	Direct Shear
%F	Fines Content
GS	Grain Size
Perm	Permeability
PP	Pocket Penetrometer
R	R-valuc
SG	Specific Gravity
TV	Torvane
TXC	Triaxial Compression
UCC	Unconfined Compression

SYMBOLS

Sample/In Situ test types and intervals

- 2-inch OD Split Spoon, SPT (140-lb. hammer, 30" drop)
- 3.25-inch OD Spilt Spoon (300-lb hammer, 30" drop)
- Non-standard penetration test (see boring log for details)
- Thin wall (Shelby) tube
- Grab
- Rock core
- Vane Shear

MONITORING WELL

- Groundwater Level at time of drilling (ATD)
- Static Groundwater Level
- Cement / Concrete Seal
- Bentonite grout / seal
- Silica sand backfill
- Slotted tip
- Slough
- Bottom of Boring

MOISTURE CONTENT

Dry	Dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water

LOG KEY 13-104 LOGS.GPJ PANGEO.GDT 6/18/13

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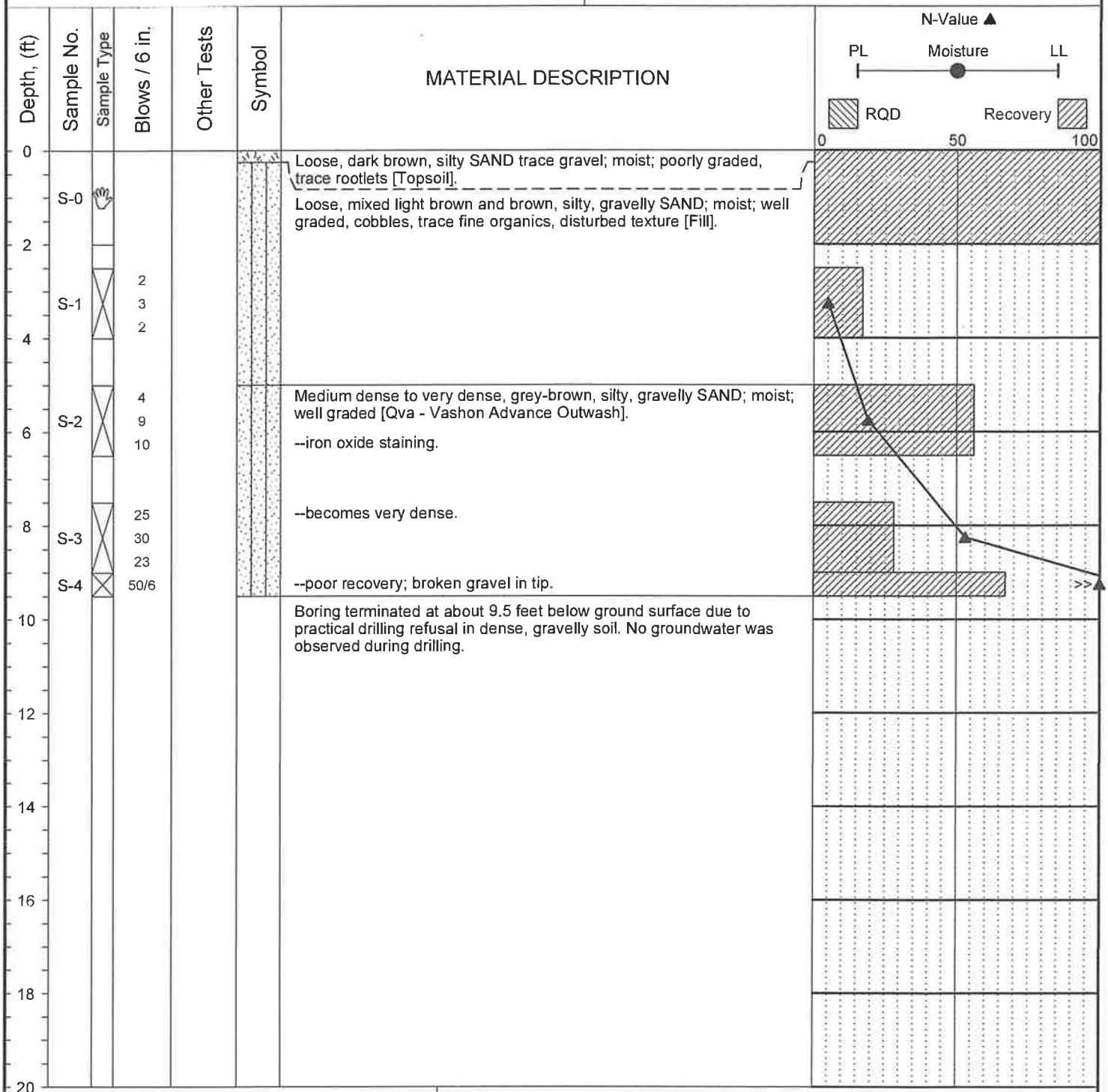
Terms and Symbols for Boring and Test Pit Logs

Figure A-1

Project:	Proposed Addition	Surface Elevation:	125.0ft
Job Number:	18-412	Top of Casing Elev.:	N/A
Location:	12229 SE 10th Street, Bellevue, WA	Drilling Method:	HSA
Coordinates:	Northing: 47.60062, Easting: -122.17574	Sampling Method:	SPT



Completion Depth:	9.5ft
Date Borehole Started:	12/27/18
Date Borehole Completed:	12/27/18
Logged By:	B. Weitering
Drilling Company:	CN Drilling, Inc

Remarks: Boring drilled using a portable hand acker drill rig. Standard penetration test (SPT) sampler driven with a 140 lb. safety hammer. Hammer operated with a rope and cathead mechanism. Surface elevation estimated from Preliminary Site Plan by Ming Architecture and Design dated November 20, 2018

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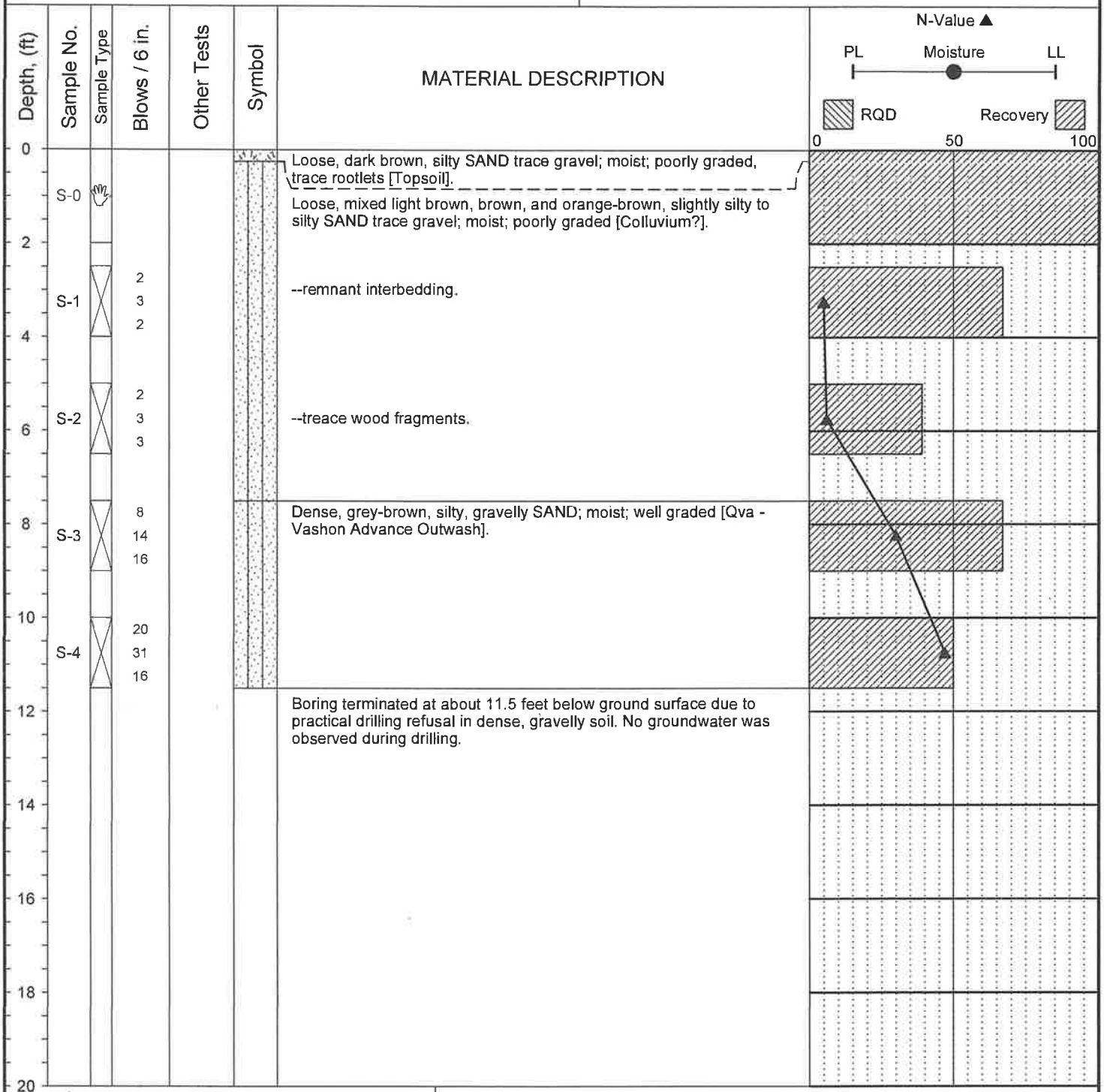
LOG OF TEST BORING PG-1

Figure A-2

The stratification lines represent approximate boundaries. The transition may be gradual.

Project:	Proposed Addition	Surface Elevation:	126.0ft
Job Number:	18-412	Top of Casing Elev.:	N/A
Location:	12229 SE 10th Street, Bellevue, WA	Drilling Method:	HSA
Coordinates:	Northing: 47.60056, Easting: -122.17572	Sampling Method:	SPT



Completion Depth:	11.5ft
Date Borehole Started:	12/27/18
Date Borehole Completed:	12/27/18
Logged By:	B. Weitering
Drilling Company:	CN Drilling, Inc

Remarks: Boring drilled using a portable hand acker drill rig. Standard penetration test (SPT) sampler driven with a 140 lb. safety hammer. Hammer operated with a rope and cathead mechanism. Surface elevation estimated from Preliminary Site Plan by Ming Architecture and Design dated November 20, 2018

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LOG OF TEST BORING PG-2

Figure A-3

The stratification lines represent approximate boundaries. The transition may be gradual.